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Digital Enhanced Cordless Telecommunications (DECT); Wireless Relay Station (WRS)

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Digital Enhanced Cordless Telecommunications (DECT) Project of the European Telecommunications Standards Institute (ETSI).

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1 Scope

This European Telecommunication Standard (ETS) defines the Digital Enhanced Cordless Telecommunications (DECT) Wireless Relay Station (WRS). A WRS is an additional building block for the DECT fixed network.

This ETS defines provisions needed for a controlled and reliable application of the DECT WRS infrastructure building block. These provisions are not related to any specific profile.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ETS 300 175-1: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".
- [2] ETS 300 175-2: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical layer (PHL)".
- [3] ETS 300 175-3: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer".
- [4] ETS 300 175-4: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer".
- [5] ETS 300 175-5: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".
- [6] ETS 300 175-6: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing".
- [7] ETS 300 175-7: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".
- [8] ETS 300 175-8: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech coding and transmission".
- [9] ETR 043: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Services and facilities requirements specification".
- [10] ETR 246: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Application of DECT Wireless Relay Station (WRS)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

Cordless Radio Fixed Part (CRFP): A WRS that provides independent bearer control to a Portable radio Termination (PT) and Fixed radio Termination (FT) for relayed connections.

Fixed Part (DECT Fixed Part) (FP): A physical grouping that contains all of the elements in the DECT network between the local network and the DECT air interface.

NOTE 1: A DECT FP contains the logical elements of at least one FT, plus additional implementation specific elements.

Fixed radio Termination (FT): A logical group of functions that contains all of the DECT processes and procedures on the fixed side of the DECT air interface.

NOTE 2: A FT only includes elements that are defined in the DECT CI standard. This includes radio transmission elements together with a selection of layer 2 and layer 3 elements.

Handover: The process of switching a call in progress from one physical channel to another physical channel. These processes can be internal (see internal handover) or external (see external handover).

NOTE 3: There are two physical forms of handover, intra-cell handover and inter-cell handover. Intra-cell handover is always internal. Inter-cell handover can be internal or external.

Inter Working Unit (IWU): A unit that is used to interconnect sub networks.

NOTE 4: The IWU contains the inter-working functions necessary to support the required sub network inter-working.

Medium Access Control (MAC) Connection (CONNECTION): An association between one source MAC Multi-Bearer Control (MBC) entity and one destination MAC/MBC entity. This provides a set of related MAC services (a set of logical channels), and it can involve one or more underlying MAC bearers.

Portable Part (DECT Portable Part) (PP): A physical grouping that contains all elements between the user and the DECT air interface. PP is a generic term that may describe one or several physical pieces.

NOTE 5: A DECT PP is logically divided into one PT plus one or more Portable Applications (PAs).

Portable radio Termination (PT): A logical group of functions that contains all of the DECT processes and procedures on the portable side of the DECT air interface.

NOTE 6: A PT only includes elements that are defined in the DECT CI standard. This includes radio transmission elements (layer 1) together with a selection of layer 2 and layer 3 elements.

Radio Fixed Part (RFP): One physical sub-group of a FP that contains all the radio end points (one or more) that are connected to a single system of antennas.

Repeater Part (REP): A WRS which relay the information within the half frame time interval.

Wireless Relay Station (WRS): A physical grouping that combines elements of both PTs and FTs to relay information on a physical channel from one DECT termination to a physical channel for another DECT termination.

NOTE 7: The DECT termination can be a PT or an FT or another WRS.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

AC	Authentication Code
ARI	Access Rights Identity
BMC	Broadcast Message Control
C/O	Connection Oriented mode
CK	Cipher Key
CN	Carrier Number
CRFP	Cordless Radio Fixed Part
DCK	Derived Cipher Key
DECT	Digital Enhanced Cordless Telecommunications
DLC	Data Link Control
ETR	European Telecommunication Report
FMID	Fixed part MAC Identity
FP	Fixed Part
FT	Fixed radio Termination
IPUI	International Portable User Identity
IWU	Inter Working Unit
KSG	Key Stream Generator
LCE	Link Control Entity
LLME	Lower Layer Management Entity
MAC	Medium Access Control
MBC	Multi Bearer Control
MMI	Man Machine Interface
NWK	Network
OA&M	Operation, Administration and Maintenance
PA	Portable Application
PARI	Primary Access Rights Identity
PARK	Portable Access Rights Key
PHL	Physical Layer
PMID	Portable part MAC Identity
PP	Portable Part
PT	Portable radio Termination
PUN	Portable User Number
REP	Repeater Part
RFP	Radio Fixed Part
RFPI	Radio Fixed Part Identity
RMBC	Relay Multi Bearer Control
RPN	Radio fixed Part Number
RX	Receive
SAP	Service Access Point
SN	Slot pair Number
TBC	Traffic Bearer Control
TBR	Technical Basis for Regulation
TPUI	Temporary Portable User Identity
TX	Transmit
WRS	Wireless Relay station

4 Wireless Relay Station (WRS)

4.1 Introduction

A WRS is a physical grouping that contains both Fixed radio Termination (FT) and Portable radio Termination (PT) elements, and that transfers information between a Radio Fixed Part (RFP) and a Portable Part (PP). The FT element acts towards a PP exactly as an ordinary RFP. The PT element acts like a PP towards the RFP, and is locked to the closest RFP. The WRS contains inter-working between its FT and its PT, including transparent transfer of the higher layer DECT services. WRS links may be cascaded.

Compared to an RFP, a WRS may introduce capacity restrictions to the services offered. The restrictions may increase with the number of cascaded WRS links (hops). Single WRS link applications can be generally applied. However, special precautions are needed when applying cascaded WRS links. The capacity may be too low, or there may be a need to adjust the echo control requirements.

A WRS shall comply with the general FT identities requirements for RFPs. Installing or adding a WRS to a DECT infrastructure is not possible outside the control of the system operator/installer/owner, who provides the required system identities, access rights and authentication/encryption keys.

4.2 Description

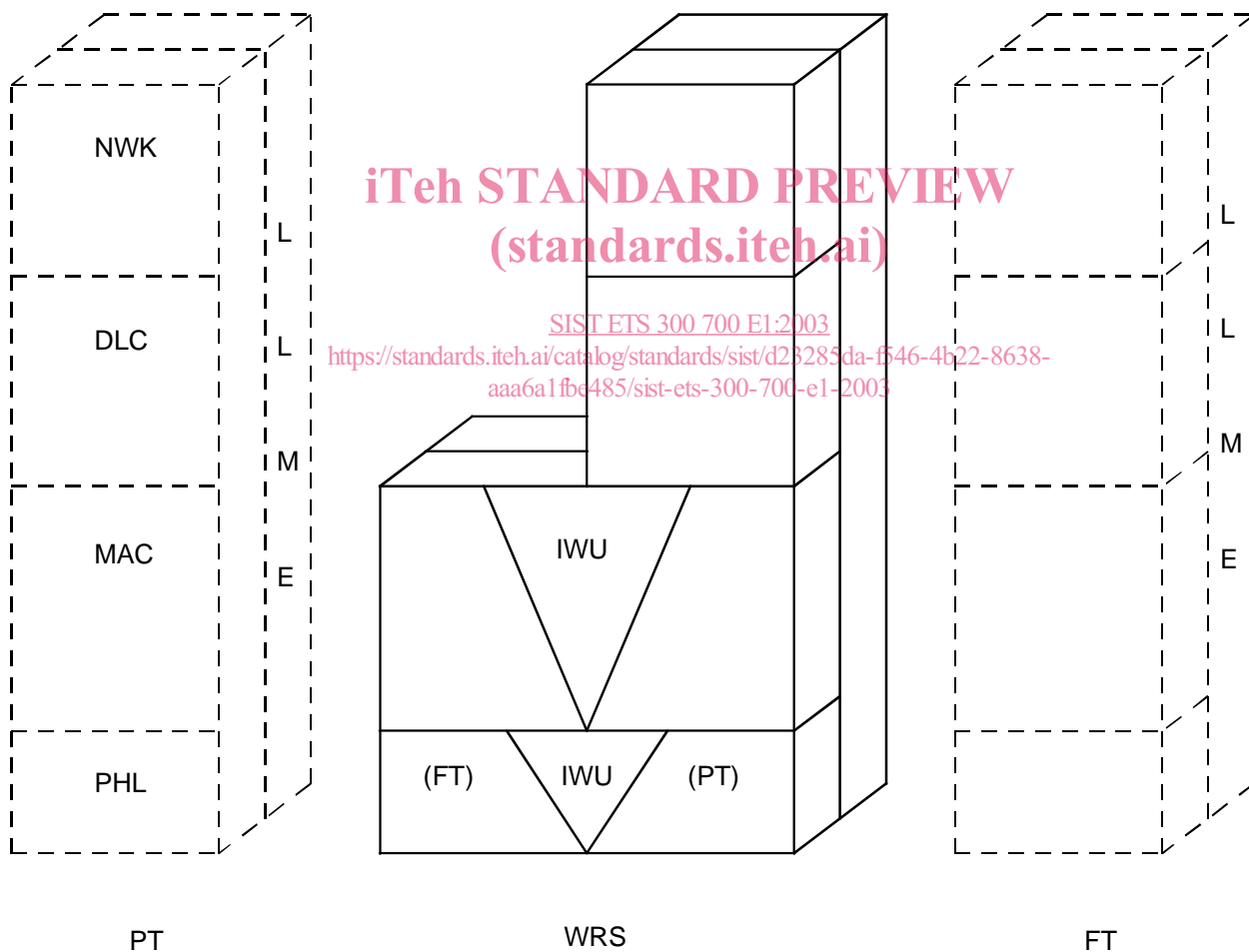


Figure 1: WRS reference model, Protocol stack model

The WRS, as shown in figure 1, provides inter-working on the DECT air interface between a PT and an FT as described in ETS 300 175, Parts 1 to 8, [1] - [8].

The PT may also be the PT side of a WRS in a multi-hop scenario.

The reference model of figure 1 establishes the following basic principles of the WRS:

- inter-working with PTs as defined by ETS 300 175 , Parts 1 to 8, [1] - [8];
- inter-working with FTs as defined by ETS 300 175, Parts 1 to 8, [1] - [8], with additions defined in this ETS;
- inter-working between PT and FT side is provided at Medium Access Control (MAC) layer and Physical (PHL) layer;
- a logical grouping of PT and WRS operates as a PT;
- a logical grouping of FT and WRS operates as a FT.

Looking towards the PT the WRS is fully protocol transparent. The PT cannot distinguish the WRS from any other RFP within an FT. Therefore, the WRS puts no additional requirements on the PT.

4.2.1 PHL layer functions

The WRS shall fulfil the following PHL layer requirements:

- the WRS shall for the relevant packet type meet the PP requirements in ETS 300 175-2 [2] when it is acting as a PP, and meet the RFP requirements in ETS 300 175-2 [2] when it is acting as an RFP, except that the timing requirements in ETS 300 175-2 [2], subclause 4.2.4. shall be met by all WRS transmissions and that the requirement in ETS 300 175-2 [2], subclause 4.2.5 on difference between reference timers shall be disregarded;
- Z-field mapping as defined in ETS 300 175-2 [2], subclause 4.8 shall be supported.

4.2.2 MAC layer functions

The WRS provides inter-working at the MAC layer. The WRS incorporates PT and FT functions as defined in ETS 300 175-3 [3].

The WRS shall fulfil the obligatory requirements of ETS 300 175-3 [3], subclauses 11.4 and 11.6, with the modifications as defined in this ETS.

4.2.3 Data Link Control (DLC) layer functions

The WRS may incorporate DLC layer PT functionality to support communication with the FT according to ETS 300 175-4 [4].

4.2.4 NWK layer functions

The WRS may incorporate NWK layer PT functionality to support communication with the FT according to ETS 300 175-5 [5].

4.2.4.1 Over-the-air maintenance

If Operation, Administration and Maintenance (OA&M) information transfer is supported, it may use the <<IWU-TO-IWU>> information element (see ETS 300 175-5 [5], subclause 7.7.23) in NWK layer messages. This element can accommodate unstructured user specific data. For over the air maintenance, a link towards the WRS is created using the PP identity of the WRS.